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A SYSTEM 2000 INVENTORY MANAGEMENT SYSTEM FOR CCRMP

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A SYSTEM 2000 INVENTORY MANAGEMENT SYSTEM FOR CCRMP

by

W.S. Bowman*

SUMMARY

A system 2000 data base has been developed to manage the inventory of CCRMP reference materials and to handle the day-to-day processing of orders. The data base is fully described and details on updates and retrievals are presented.

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UN SYSTÈME 2000 POUR LA GESTION D'INVENTAIRE POUR LE PCMRC

par

W.S. Bowman*

RÉSUMÉ

On a développé un système 2000 de base de données afin de gérer l'inventaire du PCMRC des matériaux de référence, et pouvoir ainsi répondre aux demandes journalières. On a complètement décrit la base de données et on a presenté les détails sur les mises à jour ainsi que les récupérations.

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BACKGROUND

The Canadian Certified Reference Materials Project (CCRMP) is a producer and distributor of compositional reference materials (RM's) operating within the CANMET program structure. It currently handles over 60 materials with an inventory of 37 000 units, mostly as 200-g bottles of powdered ore or concentrate. CCRMP has over a thousand RM users from all corners of the earth.

It was found that, periodically, holders of certain RM's had to be notified about important information that came to light after their purchase. CCRMP had, as well, to provide lists to regulatory agencies of purchasers of certain materials. For these reasons and simply to keep track of the rather large inventory, the help of the computer was enlisted in 1978. A computerized inventory system was set up which was based on the CONTROL DATA CORP. product UPDATE (1). This system kept track of customers' addresses and total purchases over the years. It was fairly simple to update the data files using pre-punched data cards and a series of programs written in FORTRAN. This system did an excellent job of keeping track of the inventory. However, it was not simple to keep track of customer changes and over the years a lot of errors crept into the system. There were a couple of major corrections made, but by late 1982 the addresses were so out of date that they were nearly useless. Also it was not possible to retrieve information from the system at a moment's notice. A FORTRAN program had to be written for each different set of retrieval conditions.

A NEW APPROACH

Many of the programs written for the old system were concerned with file management. It was felt that the use of a data base management system (DBMS) would remove the burden of data management and allow CCRMP to put more information into its system and get a lot more out.

System 2000* (S2K) was chosen because it is a powerful DBMS which is available at the Computer Science Centre (CSC) as well as hundreds of other

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*System 2000 is a DBMS developed and maintained by Intel Systems Corporation, Austin, Texas

centres in North America. S2K has an IMMEDIATE ACCESS feature, QUEST, which allows retrieval and update of data interactively, a REPORT WRITER to generate simple or complex reports on an ad hoc basis, and a FORTRAN (or other language) Procedural Language Extension (PLEX) for large-scale loading of data and customized retrievals.

The greatest advantage of using the S2K data base is to be able to call up specific customer information on the screen and add to it or modify it on the spot using the QUEST feature. To take advantage of this, CCRMP has acquired a video display terminal, desktop printer and micro diskette system all of which are connected to the CSC Cyber computer over a dedicated phone line.

DATA BASE DESCRIPTION

The hierarchial or tree logical structure of the CCRMP inventory data base (which is named simply CCRMP) is shown in Figure 1a. The S2K definition commands are given in Figure 1b. Two actual data trees are shown in Figures 2. Obviously, a customer can have any number of transactions and each transaction can be for any number of reference materials.

A detailed description of each schema item follows:

1. CUST. NO. - a unique customer number in the range 1-99999. Each new customer added to the data base is automatically assigned a CUST. NO. equal to the previous new customer's + 1.

2. COMPANY NAME - a 20-character alphanumeric which by itself will identify the customer or at least restrict the choice to a few possible customers.

3. FIRST LETTER - the first letter of the company name. This is used to help in the search for customers during retrieval.

Figure 1a. Schema tree of CCRMP inventory data base

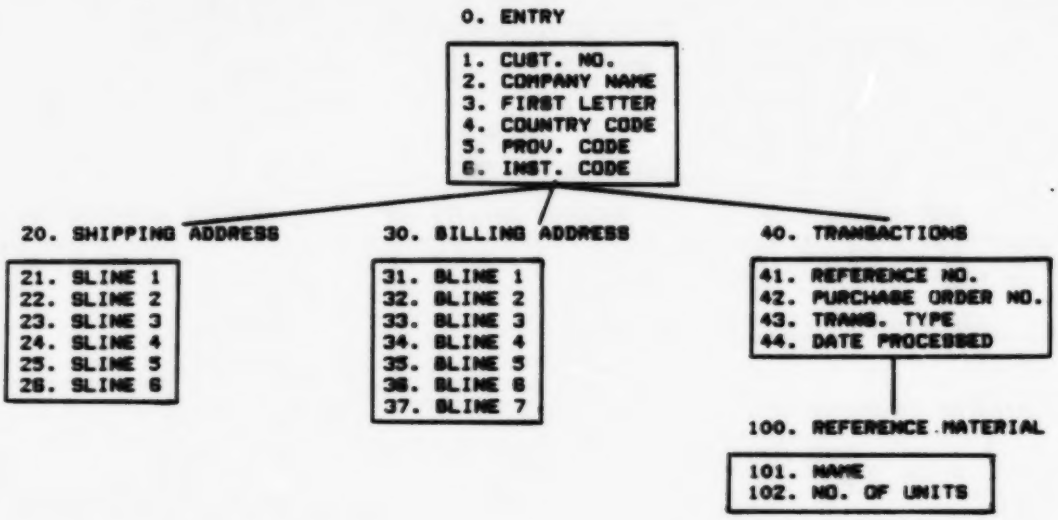


Figure 1b. CCRMP inventory data base definition

```
1*    CUST. NO. (INTEGER NUMBER S(5))\
2*    COMPANY NAME (CHAR X(20))\
3*    FIRST LETTER (CHAR X)\
4*    COUNTRY CODE (CHAR XXX WITH MANY FUTURE ADDITIONS)\
5*    PROV. CODE (CHAR XXXX WITH MANY FUTURE ADDITIONS)\
6*    INST. CODE (CHAR XXX WITH MANY FUTURE ADDITIONS)\
20*   SHIPPING ADDRESS (RECORD)\
        21*   SLINE 1 (NON-KEY NAME X(35) IN 20)\
        22*   SLINE 2 (NON-KEY NAME X(35) IN 20)\
        23*   SLINE 3 (NON-KEY NAME X(35) IN 20)\
        24*   SLINE 4 (NON-KEY NAME X(35) IN 20)\
        25*   SLINE 5 (NON-KEY NAME X(35) IN 20)\
        26*   SLINE 6 (NON-KEY NAME X(35) IN 20)\
30*   BILLING ADDRESS (RECORD)\
        31*   BLINE 1 (NON-KEY NAME X(35) IN 30)\
        32*   BLINE 2 (NON-KEY NAME X(35) IN 30)\
        33*   BLINE 3 (NON-KEY NAME X(35) IN 30)\
        34*   BLINE 4 (NON-KEY NAME X(35) IN 30)\
        35*   BLINE 5 (NON-KEY NAME X(35) IN 30)\
        36*   BLINE 6 (NON-KEY NAME X(35) IN 30)\
        37*   BLINE 7 (NON-KEY NAME X(35) IN 30)\
40*   TRANSACTIONS (RECORD)\
        41*   REFERENCE NO. (CHAR X(6) IN 40)\
        42*   PURCHASE ORDER NO. (CHAR X(20) IN 40)\
        43*   TRANS. TYPE (CHAR X(11) IN 40 WITH MANY FUTURE ADDITIONS)\
        44*   DATE PROCESSED (DATE IN 40)\
        100*  REFERENCE MATERIAL (RECORD IN 40)\
                101*   NAME (CHAR X(5) IN 100 WITH MANY FUTURE ADDITIONS)\
                102*   NO. OF UNITS (INTEGER SSS IN 100 WITH MANY FUTURE ADDITIONS)\
```

Figure 2a. Data tree for customer no. 1051

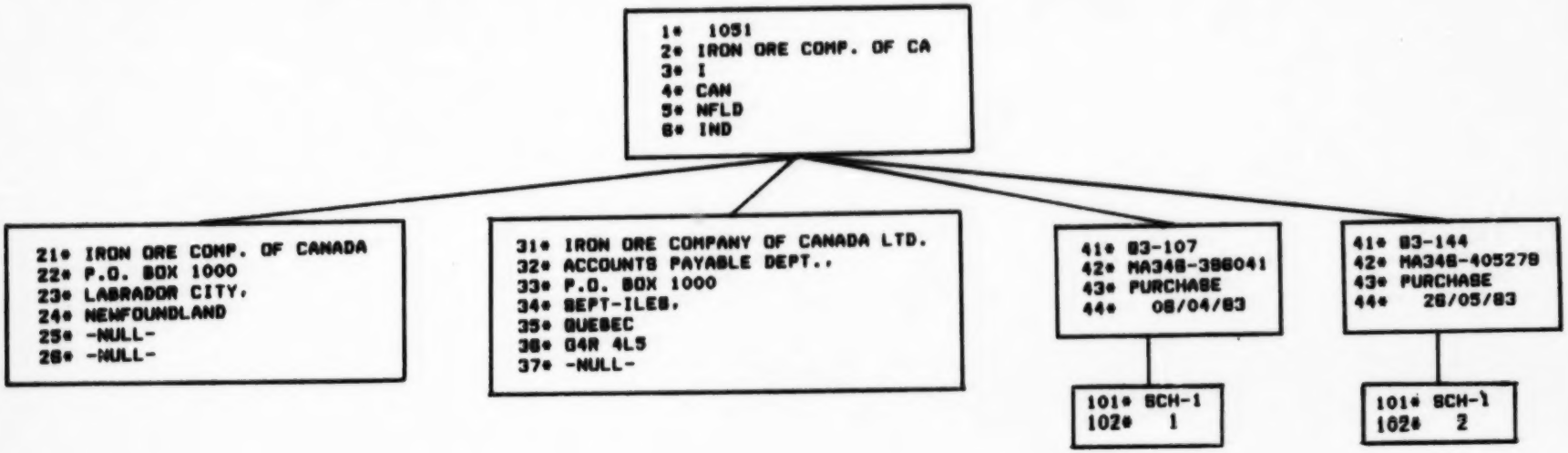
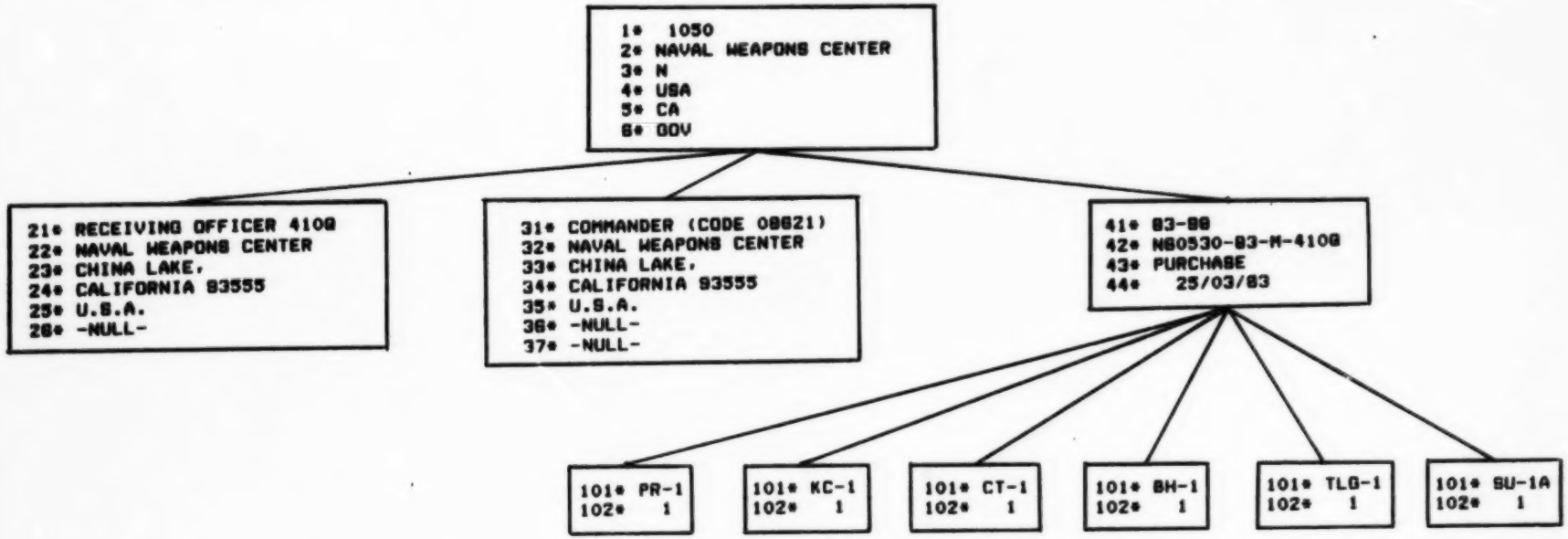


Figure 2b. Data tree for customer no. 1050



4. COUNTRY CODE - a three-character code representing the country of the customer, the following tally shows the 30 codes in use at the present time.

```
TALLY C4\
*********************************************
 ITEM-          COUNTRY CODE
*********************************************
OCCURRENCES    VALUE
---------------------------------------------
        69       AUS
         9       BEL
         6       BRA
         4       CAM
       314       CAN
        11       CHI
         3       CZE
         6       DEN
        56       ENG
         4       FIN
        13       FRA
        39       GER
        15       IND
         9       IRA
         7       IRE
         4       ISR
        10       ITA
         7       JAP
         3       MAL
         8       NET
         8       NOR
        11       NZ
        33       OTH
         3       POR
        22       RSA
        13       SPA
        12       SWE
         9       SWI
       357       USA
         5       ZAM
---------------------------------------------
        30  DISTINCT VALUES
---------------------------------------------
      1070  TOTAL OCCURRENCES
---------------------------------------------
---
```

5. **PROV. CODE** - **a four-character provincial or state code. For countries other than Canada and USA, this is normally left blank. The following tally shows the 60 codes in use at the present time.**

TALLY C5\

ITEM- PROV. CODE

OCCURRENCES	VALUE	OCCURRENCES	VALUE
8	AK	2	ND
3	AL	11	NFLD
24	ALTA	9	NJ
21	AZ	11	NM
58	BC	19	NS
26	CA	7	NV
38	CO	4	NWT
3	CT	29	NY
1	DC	16	OH
2	FL	4	OK
3	GA	109	ONT
4	IA	6	OR
3	ID	13	PA
12	IL	1	PR
5	IN	38	QUE
3	KS	1	RI
3	KY	13	SASK
3	LA	1	SC
12	MA	2	SD
19	MAN	2	TN
5	MD	19	TX
1	ME	9	UT
10	MI	6	VA
10	MN	1	VIC
7	MO	1	VT
1	MORO	15	WA
1	MS	8	WI
4	MT	1	WV
16	NB	1	WY
4	NC	3	YUK

60 DISTINCT VALUES

672 TOTAL OCCURRENCES

6. INST. CODE - a three-character code denoting the type of institution. The following tally shows the four codes in use at the present time.

TALLY C6\

ITEM-	INST. CODE	
OCCURRENCES	VALUE	
107	COM	(commercial lab)
199	GOV	(government inst)
500	IND	(industrial inst)
264	LRN	(inst of learning)
4	DISTINCT VALUES	
1070	TOTAL OCCURRENCES	

20. SHIPPING ADDRESS - this record consists of 6 data items each one of which is a line of the shipping address. They may be accessed individually as items 21 to 26. Each line can have a maximum of 35 characters so that the address will fit on a standard sticky address label.

30. BILLING ADDRESS - this is similar to the shipping address except that there is one additional line provided. This is so that the billing address can be generated automatically from the shipping address by adding the line "ACCOUNTS PAYABLE DEPARTMENT". Of course, a completely different billing address can be used as in the examples in Figures 2.

40. TRANSACTIONS - each purchase or set of materials sent to a participating laboratory is considered a separate transaction record made up of the following 4 items.

41. REFERENCE NO. - this a unique 6-character code assigned by CCRMP to the transaction.

42. PURCHACE ORDER NO. - this is the customer's purchase order number and may be omitted. It is usually blank for participant or null transactions.

43. TRANS. TYPE - an eleven-character code denoting the type of transaction. There are three possibilities:

PURCHASE - a normal purchase of reference materials.

PARTICIPANT - materials sent at no charge to a laboratory in order that they may participate in the interlaboratory certification program.

'blank' - a null entry indicates that materials are sent at no charge for some other reason, usually as free replacements to past participants.

44. DATE PROCESSED - usually the date entered to the data base unless it is an old transaction. Dates are of the form DD/MM/YY.

100. REFERENCE MATERIAL - each different material is entered as a separate record made up of the following 2 items.

101. NAME - the names of the RM's are represented by 5-character codes which are assigned by CCRMP. The following tally shows the 56 codes in use at the present time.

TALLY C101\

ITEM-	NAME		
OCCURRENCES	VALUE	OCCURRENCES	VALUE
157	BH-1	20	MP-2
181	BL-1	357	MRG-1
144	BL-2	21	MW-1
3	BL-2A	84	OKA-1
154	BL-3	85	PD-1
119	BL-4	23	PHBRZ
21	BL-4A	212	PR-1
113	BL-5	93	PTA-1
188	CCU-1	232	PTC-1
148	CD-1	141	PTM-1
150	CPB-1	74	RU-1
161	CT-1	158	SCH-1
1	CURD1	98	SL-1
1	CURD2	276	SO-1
31	CURD3	250	SO-2
59	CURD4	238	SO-3
145	CZN-1	248	SO-4
177	DH-1	146	SU-1
67	DH-1A	126	SU-1A
126	DL-1	351	SY-2
97	DL-1A	314	SY-3
64	FER	24	TAN-1
25	GTS-1	163	TLG-1
217	HV-1	235	UM-1
249	KC-1	115	UM-2
323	MA-1	112	UM-4
129	MA-2	22	UTS-1
287	MP-1	22	UTS-2
64	MP-1A	25	UTS-3
		25	UTS-4

59 DISTINCT VALUES

7891 TOTAL OCCURRENCES

One additional code, FESET, has been established but as yet has no entries in the data base.

102. NO. OF UNITS - the number of units, usually bottles, of the RM in question. This is required for inventory purposes.

CONVERSION OF THE OLD SYSTEM

Although the addresses in the old system were out of date, it was felt worthwhile to convert the old records to the S2K system because they contained an almost complete total of the stock of RM's sold between 1978 and 1983. The dates of individual transactions were not recorded but rather a cumulative record of each material received by each customer broken into subtotals for purchases and participants was kept along with the date of the last transaction. A series of special programs were written to extract this information and input it to the S2K data base. Additional information was input and address changes made using the QUEST language.

UPDATING THE DATA BASE

While unique changes or additions to the data base are best and easily accomplished with the interactive language QUEST, large and repetitive-type additions are best done with a program. Such a program has been written to add transactions to the data base using the FORTRAN Procedural Language Extention (PLEX). PLEX programs, which interact directly with the data base, are processed first by a PLEX Processor which generates standard FORTRAN code. This source code is then compiled by the normal FORTRAN Compiler and executed in the usual fashion. CSC has set up a Cyber Control Language Procedure (CCL PROC) to simplify this whole operation. All PLEX programs require over 77 K (octal) to run on the CYBER and therefore must be run in Batch mode as opposed to interactively. This is unfortunate, since the assemblage of the data for the updating PLEX program would be best done interactively. To overcome this deficiency, an interactive driver program, INTPREP, has been written which assembles a complete Batch job interactively with appropriate prompts. Furthermore, a CCL PROC has been set up to execute INTPREP, supply comments, batch the job to the input queue and look after most error processing. The name of the PROC is CCRMP; so to enter transactions to the data base, one need only type "begin,

ccrmp" and then follow instructions. An example follows wherein data entered by the user is in lower case and prompts from the computer are in upper case.

Figure 3. Example of updating the data base using PROC CCRMP

```
begin,ccrmp

DATA ENTRY FOR UPDATING CCRMP DATA BASE

IS THIS TRANSACTION FOR A NEW OR OLD CUSTOMER?
(ENTER 'NEW' OR 'OLD')
old

ENTER CUSTOMER NO. (MAX 5 DIGITS - NO LETTERS OR SPECIAL CHARS)
1051

ENTER REF. NO. (MAX 6 CHARS)
83-500

TODAY'S DATE IS: 31/10/83

DO YOU WISH TO USE A DIFFERENT DATE FOR THIS TRANSACTION? (ENTER 'Y' OR 'N')
n

IS THIS TRANSACTION A PURCHASE? (ENTER 'Y' OR 'N')
y

ENTER PURCHASE ORDER NO. (MAX 50 CHARS) OR ENTER A BLANK
ak51-1c

ENTER MATERIAL NAME - IF NO MORE MATERIALS, ENTER 'END'
sch-1

ENTER NO. OF UNITS OF SCH-1 (MAX 99)
3

ENTER MATERIAL NAME - IF NO MORE MATERIALS, ENTER 'END'
mw-1

ENTER NO. OF UNITS OF MW-1  (MAX 99)
2

ENTER MATERIAL NAME - IF NO MORE MATERIALS, ENTER 'END'
end

ARE THERE MORE TRANSACTIONS? (ENTER 'Y' OR 'N')
n

ALL OF THE DATA ENTERED HAS BEEN SUBMITTED TO S2K
TO UPDATE THE DATA BASE IN A BATCH JOB
(A COPY OF THE DATA IS ALSO STORED IN FILE S2KTEMP FOR 5 DAYS)

THE PRINT-OUT WILL COME BACK HERE AS A REMOTE OUTPUT FILE

COMMAND-
```

The example given is for an existing customer. Details on how to find CUSTOMER NO. for these are given later. For new customers, additional information (addresses, country code, etc.) are requested via suitable prompts; CUSTOMER NO. is automatically assigned.

As mentioned, the PROC CCRMP does not update the data base directly but rather creates and submits a batch job to do this. A copy of the job is kept on permanent file for 5 days. The copy of the job in the above example is shown in Figure 4. Since the job is run automatically, the user need not concern himself too much with Figure 4. It is shown to emphasize the point that the actual updating of the data base is done in a separate step by the PLEX program UPDAT4. What is important to realize is that the interactive procedure does not have direct access to the data base and can not verify that all data entered is acceptable.

Figure 4. Copy of the batch job created and submitted as shown in Figure 3

```
attach,b,s2ktemp,id=wsb,cy=12
COMMAND- copysbf,b



ICCRM,CM120000,T100,I0500,P2.
ACCOUNT,*****.
ATTACH,UPDAT4,ID=WSB.
BEGIN,S2K,,S2KFTN,INPUT=UPDAT4,OUTPUT=0.
ATTACH,LIB,CCRMPLIB,ID=WSB,MR=1.
LIBRARY,LIB.
LGO.
 1051      83-500     31/10/83  AK51-LC
SCH-1 3
MW-1  2

COMMAND-
```

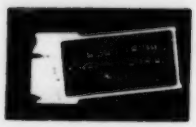
If there are erroneous data, they will not be known until after the batch output is recovered and printed. If the job must be re-run, the copy stored in S2KTEMP could be attached and edited rather than repeating the entire procedure.

The output from the updating program is designed to go on a printed form used by CCRMP. It is a 4-part form used for transmittal (invoice) and for a packing slip. The top copy of the form for our example job is shown in Figure 5.

As shown near the bottom of Figure 3, several transactions can be entered at one time and each one will generate a separate output form.

The PLEX program enters these transactions to the data base one at a time. If an error occurs, a suitable message will be printed on the output form. All transactions before the error will be correctly entered to the data base. The transaction with the error and all subsequent transactions will not be entered. For this reason, it is recommended that not too many transactions be entered at one time. In rare circumstances, it might be possible that a partial transaction is entered before an error is encountered. If there is any doubt, this can easily be checked and the erroneous transaction removed with the QUEST language.

Figure 5. Example output from updating procedure.



TRANSMITTAL SLIP / FICHE D'ACCOMPAGNEMENT

CANADIAN CERTIFIED REFERENCE MATERIALS PROJECT
LE PROJET CANADIEN DES MATÉRIAUX DE RÉFÉRENCE
588 RUE BOOTH STREET • OTTAWA • ONTARIO • CANADA • K1A 0G1
TEL. NO. / N° DE TEL. (613) 995-4729
TELEX NO. / N° DE TELEX 053-3569

REF. N°
83-500

DATE 31/10/83

PURCHASE ORDER/BON DE COMMANDE: AK51-LC

SHIP TO / EXPÉDIER À:
IRON ORE COMP. OF CANADA
P.O. BOX 1000
LABRADOR CITY,
NEWFOUNDLAND

INVOICE TO / FACTURER À:
IRON ORE COMPANY OF CANADA LTD.
ACCOUNTS PAYABLE DEPT.,
P.O. BOX 1000
SEPT-ILES,
QUEBEC
G4R 4L5

ITEM	CODE	DESCRIPTION	UNIT/UNITÉ	COST/COÛT	TOTAL
1	SCH-1	IRON ORE	3@200 G	70.	210.
2	MW-1	IRON ORE	2@200 G	70.	140.

INCLUDE REPORTS/ ENVOYEZ RAPPORTS 75168, 78-5

TAX/TAXE

TOTAL ▶

OTTAWA
F.O.B./F.A.B.

DATE SHIPPED/D'EXPÉDITION

VIA/PAR

FOR C.C.R.M.P./POUR C.C.R.M.P.

1031

INVENTORY

The inventory of each RM is not stored in the data base. The data base, however, keeps track of all transactions and their date. The inventory at any given date is then found by subtracting those units issued, found from the data base, from the known inventory at some base date.

A physical count of all material in stock was performed by CCRMP in early 1983. This was then corrected for units distributed up to that point in the year to come up with a base inventory as of January 1, 1983. A PLEX program, S2KINV, was written incorporating these values which could give a print-out of the precise inventory on any given date (only dates after Jan. 1, 1983 are valid). For new materials, the initial inventory is used as the base value. A typical print-out from S2KINV is given in Figure 6.

RETRIEVALS

The QUEST language is simple to learn and use since it has an English-like syntax. In the example in Figure 7, the user is trying to find out if the Iron Ore Company of Canada at Labrador City, Newfoundland is an existing customer and, if so, what is the CUST. NO. This is requied for updating (see Figure 3). He requests a list of all customers beginning with the letter "i" from Newfoundland and finds that there is only one - the Iron Ore Company of Canada, No. 1051. As a check, he requests all the customers from Newfoundland (11 of them) and subsequently all Canadian customers beginning with the letter "i" (9 of these). Of the latter, there are two customers called the Iron Ore Company and he prints the shipping address of each one to be absolutely certain that the one he is searching for is No. 1051.

The two verbs shown in the example are "list" and "print". Others are "insert", "remove", "change" and "tally". Complete details are provided in the Intel documentation (2).

Figure 6.

CCRMP INVENTORY AS OF 28/10/83

MATERIAL	STOCK ON 01/01/83 *	SALES	TO PARTICIPANTS	TOTAL	BALANCE ON 28/10/83
PR-1	398	38	2	40	356
MP-1	48	23	1	24	24
MV-1	410	32	0	32	378
SU-1	62	2	1	3	59
UM-1	180	28	1	28	131
KC-1	137	35	4	39	98
SCH-1	1011	13	8	21	990
CT-1	934	13	1	14	920
BH-1	911	10	0	10	901
TLG-1	420	11	1	12	408
MA-1	475	93	14	107	368
PTA-1	248	7	0	7	241
PTM-1	185	13	1	14	171
PTC-1	426	47	1	48	378
DH-1	33	4	0	4	29
DL-1	11	0	0	0	11
BL-1	251	18	0	18	232
BL-2	185	5	1	6	179
BL-3	229	18	2	18	211
BL-4	125	7	0	7	118
BL-5	1833	30	2	32	1801
SY-2	829	87	4	71	758
SY-3	782	40	2	42	750
MRG-1	925	55	3	58	867
UM-2	303	12	0	12	291
UM-4	419	12	0	12	407
CD-1	1067	15	2	17	1050
SO-1	393	48	3	51	342
SO-2	805	30	0	30	775
SO-3	788	30	0	30	738
SO-4	617	40	0	40	577
SL-1	864	14	0	14	850
CPB-1	874	28	0	28	845
CZN-1	1023	36	0	36	987
CCU-1	546	97	5	102	444
CURD4	1	0	0	0	1
PHBRZ	9	2	0	2	7
OKA-1	1371	10	0	10	1361
SU-1A	1410	25	2	27	1383
DL-1A	1381	7	2	9	1372
CURD1	48	1	0	1	48
CURD2	94	1	0	1	93
CURD3	122	17	0	17	105
MP-1A	786	36	7	43	743
MP-2	753	0	0	0	753
PD-1	705	38	0	38	666
MW-1	1132	12	2	14	1118
DH-1A	478	25	4	29	449
MA-2	706	118	5	123	583
BL-2A	765	2	0	2	763
BL-4A	1143	3	2	5	1138
FER	669	4	10	14	655
TAN-1	955	1	2	3	952
UTS-1	1634	0	5	5	1629
UTS-2	1638	0	5	5	1633
UTS-3	1638	0	8	8	1630
UTS-4	1288	0	8	8	1281
GTS-1	711	0	27	27	684
KC-1A	696	0	0	0	696

* FOR MATERIALS CERTIFIED AFTER 01/01/83, THE INITIAL INVENTORY IS USED

COMMAND-

Figure 7. Retrieval Example

```
begin,s2k,,opt=0cr=756

*SZKMZ80*  NATURAL LANGUAGE
03/11/83  11.18.38. BEGIN SYSTEM 2000  RELEASE M2.80D
---

 AT CY= 186 SN=PUBLIC  user,westra\
---
dbn is ccrmp\
-558-   ASSIGNED   CCRMP                          1  4714 83/11/02. 18.20.38.
---
list c1,c2 wh c3 eq i and c5 eq nfld\
  CUST. NO.   COMPANY NAME
***
*      1051   IRON ORE COMP. OF CA
---
list c1,c2 wh c5 eq nfld\
  CUST. NO.   COMPANY NAME
***
*        98   ATLANTIC ANALYTICAL
*       142   CONSOLIDATED RAMBLER
*       160   NFLD-MINES, ENERGY
*       208   NFLD-MINES, ENERGY
*       258   NFLD ZINC MINES
*       380   UNIV MEMORIAL
*       381   UNIV MEMORIAL
*       382   UNIV MEMORIAL
*       383   UNIV MEMORIAL
*       386   WABUSH MINES
*      1051   IRON ORE COMP. OF CA
---
list c1,c2 wh c3 eq i and c4 eq can\
  CUST. NO.   COMPANY NAME
***
*       158   IND AFF NORTH DEV
*       216   INDUSMIN
*       217   INCO
*       218   INCO
*       219   INCO
*       220   INCO
*       221   INCO
*       222   IRON ORE COMPANY
*      1051   IRON ORE COMP. OF CA
---
print c20 wh c1 eq 222\

  21* CHIEF CHEMIST
  22* IRON ORE COMPANY OF CANADA
  23* P.O. BOX 1000
  24* SEPT-ILES, QUEBEC
  25* G4R 4L3
---
print c20 wh c1 eq 1051\

  21* IRON ORE COMP. OF CANADA
  22* P.O. BOX 1000
  23* LABRADOR CITY,
  24* NEWFOUNDLAND
---
exit\
-506-   CLOSED     CCRMP                         1  4714 83/11/02. 18.20.38.
83/11/03. 11.24.44. END   SYSTEM 2000  RELEASE M2.80D
COMMAND-
```

REFERENCES

1. Bowman, W.S. "A computerized inventory system for the CCRMP"; Laboratory Report MRP/MSL 78-97 (TR); CANMET, Energy, Mines and Resources Canada; 1978.
2. QUEST Language Specification Manual, CDC NOS and NOS/BE version; Intel Systems Corporation publication #221126; Release 2.80.

APPENDIX I

Job set-up for PLEX programs

```
1 ICCRM,CM120000,T50,IO200,P2.
2 ACCOUNT,*****.
3 ATTACH,S2KINV,ID=WSB,MR=1.
4 BEGIN,S2K,,S2KFTN,INPUT=S2KINV,OUTPUT=0.
5 ATTACH,LIB,CCRMPLIB,ID=WSB,MR=1.
6 LIBRARY,LIB.
7 LGO.
8 %EOR
9 30/09/83
10 %EOF
```

All PLEX programs must be run in Batch mode. Set-up for program S2KINV is shown above. If the date (30/09/83) is omitted, the inventory on the date the program is run is produced instead.

To run other PLEX programs, substitute the appropriate name for S2KINV on lines 3 and 4 above. Other programs are:

RTVDATE - produces a list of materials sold between two dates

FMTLIST - produces a giant output of all data stored in the data base (use with caution)

APPENDIX II

Procedure for producing address labels using QUEST

```
DATE FORMAT IS DD/MM/YY\
PRINT/STUB SUPPRESS, NULL/ \
REPORT FILE IS TAPE5\
PRINT C20 WH CO HAS C44 GE 01/01/79\
EXIT\
REWIND, TAPE5
REQUEST, TAPE6,  *Q
S2KLABL
ROUTE, TAPE6,  DC = PR, FC = L1, TID = C
```

The above procedure yields a list of all customers who have been active after Jan. 1, 1979. Any other selection is possible. For example to produce labels for the participants in the interlaboratory certification program for CPB-1, substitute the following Print statement:

```
PRINT C20 WH CO HAS (C101 EQ CPB-1 AND C43 EQ PARTICIPANT)\
```